SEATTLE CITY LIGHT

MATERIAL STANDARD

STANDARD NUMBER: **0039.3**
PAGE: 1 of 5
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SPECIALTY TRANSFORMER, DRY TYPE, OUTDOOR
PAD MOUNT AND WALL MOUNT
ONE-PHASE AND THREE-PHASE, 25 THROUGH 500 KVA

1. General

1.1 This specification covers single- or three-phase, 60 Hertz, dry-type outdoor pad and wall mounted, specialty transformers that will be used at industrial, commercial, and residential locations where size, appearance and sound level will be a consideration. Transformers shall be suitable to withstand all of the elements of the weather.

1.2 Transformers supplied under this specification shall conform to the applicable requirements of the following standards except as modified herein:

NEMA Standard TR-1

NEMA Standard ST-20

2. Ratings

2.1 The transformer voltage rating, kVA rating and number of phases shall be as specified on the purchase order.

Table 1.

277/480Y - 125/250V, 1-Phase

Wall Mount & Pad Mount

kVA	Stk. #
25	390042
37.5	390041
50	390044

Pad Mount

75	390289
100	390290
167	390291
250	390292

480Y/277 - 216Y/125V, 3-Phase

Wall Mount & Pad Mount

kVA	Stk. #
25	390043
30	391287
45	390045

Pad Mount

75	391289
112.5	391290
150	391430
225	391291
300	391292
500	391295

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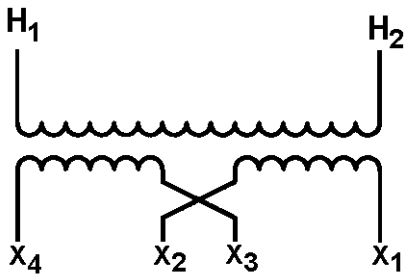
2.2 Applicable connection diagrams shall be as specified on the requisition. Refer to Figure 1 or 2. (Taps are not shown.)



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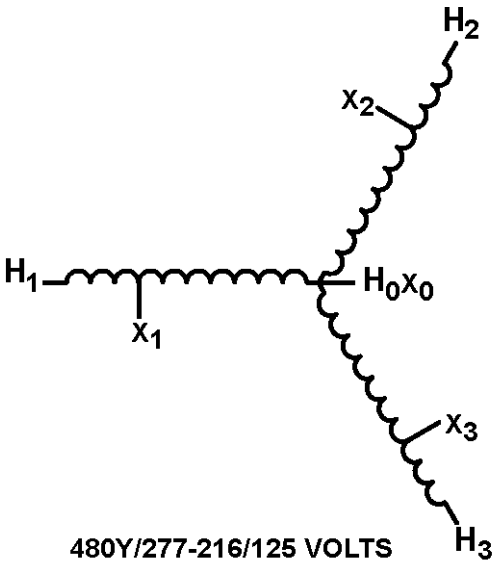
277/480Y-125/250 VOLTS
FIGURE 1

(SIMILAR TO NEMA FIG. 3-4)
(TAPS NOT SHOWN)



480Y/277-216/125 VOLTS
FIGURE 2

(NEMA FIG. 3-18)
(TAPS NOT SHOWN)

2.3 Taps

2.3.1 The transformer shall have two 2-1/2% full-capacity primary taps below rated voltage and two 2-1/2% full-capacity taps above rated voltage. Due to core construction, taps may vary 1/2%.

2.3.2 The tap connections shall be made by either a terminal board or with a switch, accessible from the front of the transformer with enclosure door open. Loose wire connections are not acceptable.

3. Insulation

3.1 Dielectric tests shall be in accordance with NEMA Standard ST-20.

3.2 The transformer shall be designed for an 80^{o} C temperature rise and this shall be stated on the bid. The insulation shall be Class 220.

4. Terminals

4.1 All terminals shall be tinned copper for bimetallic connections.

4.2 All terminals shall be drilled for NEMA two-hole connectors, 1-3/4" on centers for 1/2" bolts.

4.3 Each terminal shall accommodate the following number of cables (two cables may be connected "back-to-back" on one set of bolt holes).

Table 2.

Full Load Amperes			Cables Per Terminal
0	–	380	1
381	–	760	2
761	–	1150	3
1151	–	1520	4

5. Ground

5.1 The enclosure grounding connection shall consist of a corrosion-proof boss or pad (copper, copper-faced steel, or stainless sell) and shall be equipped with a corrosion-proof connector that will accommodate #8 solid through 2/0 AWG stranded copper wire. Boss or pad shall be located inside, near bottom of enclosure, accessible from front of transformer.

5.2 The tapped hole in the boss or pad and the stud of the connector shall be 1/2-inch 13NC, Class 2 fit. The tapped hole shall be coated with an oxide inhibiting compound before installation of the connector.

5.3 This connection shall be plainly labeled "G."

6. Nameplates

A stainless steel nameplate complete with connection diagram shall be affixed to the outside of the enclosure door, using stainless steel fasteners. The nameplate shall state all information listed below:

(a) The identification "transformer"

(b) Class of cooling: AA

(c) Number of phases

(d) Frequency

(e) kVA rating

(f) Voltage rating

(g) Temperature rise

(h) Name of manufacturer

(i) Vector diagram (for three-phase transformers only)

(j) Tap voltage(s)

(k) Percent impedance

(l) Connection diagram

(m) Approximate total weight

(n) Year of manufacture

7. Lifting Lugs

Removable external lifting lugs of adequate strength and size shall be provided and arranged to provide a suitable lift for placement of the transformer with crane or boom. Lugs shall be located above the center of gravity.

8. Enclosure construction and Finish

8.1 A single cabinet shall be affixed to the transformer, which shall enclose the primary and secondary terminals. The cabinet shall be weatherproof, and the top of the cabinet shall be constructed so as to shed water. The enclosure security shall be able to withstand the wire probe test of NEMA Standard TR-1, Part 2, pages 1 and 5. All bolt-down connections shall be located internally. The cabinet door shall be hinged opening outward and be provided with a means of padlocking. Liftup or vertical opening doors are not acceptable. The cabinet may be of the detachable type. The transformers shall not have any nuts, bolts, screws, handles, or any other detachable equipment exposed to the public. The transformer must be suitable for installation on a concrete pad with conduits entering through the pad, except 25 kVA, 37.5 kVA, and 50 kVA single-phase, and 25 kVA, 30 kVA, and 45 kVA three-phase transformers shall be suitable for pad mount installation and wall mounting with conduits entering from the bottom.

8.2 The transformer and cabinet shall have a flow coat primer of rust-resisting paint. The primer coat shall be followed by two flow coats of finish paint. All paint applied shall be highly resistant to oil and weathering. The finish coats shall be semi-gloss dark green, similar in color to Munsell 7GY 3.29/1.5. Reasonable color variations are acceptable upon approval. The total point thickness shall be 3 mils minimum when measured with a magnetic thickness gage.

9. Noise

Standard transformer sound level shall not exceed the values listed in the following table.

Table 3.

kVA			Decibels
75	—	150	50
151	—	300	55
301	—	500	60

The sound level of the transformers may be tested by City Light. Transformers failing to meet the average sound levels listed above will be rejected and returned at the manufacturer's expense.

10. Losses

Transformer losses will be evaluated at full load at 100^{o} C on the following basis:

(a) Core losses at $5.90 per watt.

(b) Load losses at $2.60 per watt.

(Total losses = Core losses + Load losses)

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11. Electrical Tests

11.1 Electrical tests shall be made in accordance with the latest revision of NEMA Standard ST-20.

11.2 Each transformer shall have a durable, weatherproof tag firmly attached, reading: "This transformer has been tested at rated line voltage and has successfully passed all applicable tests specified by NEMA." The tag shall show the transformer serial number, the date, and name of the person who made the test. (State of Washington, Safety Statutes, Section 19.29.010, Rule 5.)

12. Data to be Submitted with Bid

Each bidder shall submit with the proposal the data listed below. Product evaluation and conformance to specification will be determined strictly on the basis of information submitted. The drawings and data furnished must be in sufficient detail and clarity to enable making a complete and positive check with the technical provisions of this specification.

(a) Outline drawings with overall dimensions, terminals, and ground connections.

(b) Average core losses and load losses (windings) at full load at 100^{o} C.

(c) Sound level.

(d) Impedance of windings at rated load, expressed in percent of rated voltage.

(e) Information concerning details of construction, enclosure material, and finish.

(f) Total weight of completely assembled transformer.

(g) Nameplate diagram.

13. Data to be Furnished by the Successful Bidder

The successful bidder shall supply:

(a) Three copies of outline dimensions of the transformer with the accessories.

(b) Three copies of the transformer nameplate.

(c) Three copies of an instruction book covering installation, operation, and maintenance of the equipment furnished.

(d) Three certified copies of standard tests.

14. Guarantee and Penalties

Any transformer which fails due to defective design, material, and/or workmanship within twelve months after being energized or eighteen months after delivery, shall be repaired or replaced without cost to the City of Seattle Light Department. Any defect in design, material and/or construction discovered within this period shall be corrected on all transformers furnished on this order at the manufacturer's expense, either by repair or replacement.

The manufacturer will be assessed a penalty for transformers delivered that exceed the total loss value stated and calculated on the bid proposal. Total loss value = core loss x $5.90 per watt + load loss x $2.60 per watt. The penalty shall be the difference between the total loss value delivered less the total loss value in the bid proposal. Tolerances will be allowed in accordance with ANSI C57.12.00, 1993, Section 9.3, Table 19, except "on a given order" shall mean transformers of a given size and voltage, (i.e., one line item).